THE REVIEW

DEVOTED TO THE INTERESTS OF THE AMERICAN SOCIETY FOR METALS

Volume XIV MARCH, 1941 No. 3

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S.A.E. X4130 Most Important Aircraft Steel

Reported by M. M. Holtgrieve
Hubbell & Company

St. Louis Chapter—The February meeting was held in the interest of aviation, with Richard R. Kennedy, metallurgist for the War Department Air Corps at Wright Field, Dayton, Ohio, as the main speaker. A coffee talk was given by Clarence J. Stock, chief airway traffic controller, Civil Aeronautics Administration.

Mr. Kennedy pointed out that airplane design and automobile design started at about the same time, and while their production traveled in separate lines, their methods have been very similar. It was estimated that during World War I about 30 to 40 years' progress was made in the design of airplanes, with another important era in aviation beginning with the growth of air transportation in 1930.

The modern airplane is substantially of all-metal construction. The wings and fuselage are made from high strength aluminum alloy sheets riveted together.

S.A.E. X4130 was pointed out by Mr. Kennedy as about the most important steel in aircraft construction and is used for the fuselage and engine mounts because of its weldability.

Propellers forged from aluminum alloys have largely replaced wooden propellers, although some are being made from S.A.E. 6130 steel. Crankshafts and connecting rods are being drop forged from S.A.E. 4340, 4140 and 3140.

Bearings have created quite a problem in design, since an extremely high melting point is necessary to withstand breaking down in service. The most widely used bearing metal at the

(Continued on page 8)

Short-Time Tests Are Needed by Designers

Reported by R. A. Shattuck
Inspector, Crucible Steel Co. of America

Syracuse Chapter—"Metals at Elevated Temperatures" was the topic of the lecture given by P. G. McVetty of the Westinghouse Electric & Mfg. Co. at the March meeting.

Mr. McVetty traced the history of stress-strain testing, beginning with the development of Hooke's Law in 1678 to the present-day tests, which are complicated by such variables as time, temperature, and vibrations.

In order that consumers may make intelligent specifications and acceptance tests on the numerous alloys continuously appearing on the market, it was pointed out that constant effort is being made to develop tests which can be completed in commercially short periods of time and still simulate actual service conditions.

To illustrate the practical applications of these tests by designers, Mr. McVetty gave illustrations ranging from electric light bulb filaments to giant steam turbine mechanisms.

The post-lecture discussion was active and centered largely on the topic of the effect of negative creep or shrinkage.

Reservations for Show in Philadelphia Near Capacity

Nearly 200 exhibitors have reserved space at the National Metal Exposition to be held in Philadelphia next Oct. 20 to 24, it has been announced by W. H. Eisenman, managing director.

Over 90,000 sq.ft. of the 110,000 available at Convention Hall and Commercial Museum have been contracted for, and those who plan to participate are urged to make prompt reservation.

The National Metal Exposition is held annually in conjunction with the National Metal Congress. It is sponsored by the A.S.M., with four other technical societies participating.

Western Metal Show Program Ties in With Defense Problems

Keyed to exigencies of national defense, the technical program of the Fourth Western Metal Congress, to be held May 19 to 23 in the Biltmore Hotel and Pan-Pacific Auditorium, Los Angeles, has been declared the finest from a standpoint of new aids to production yet scheduled for the Pacific Coast.

Officers and directors of the American Society for Metals and many other recognized authorities will participate in the Congress's five days of technical sessions, according to D. S. Clark, associate professor of mechanical engineering, California Institute of Technology, Pasadena, who is program chairman.

In addition, the American Welding Society, one of 20 other technical groups cooperating with the American Society for Metals in presenting the Congress, has announced morning sessions for the first four days, with three outstanding speakers on each one.

Further augmenting the program, the American Foundrymen's Association plans a session of its own for May 23, the final day of the Congress.

The Western Metal Exposition, to be held on the same dates in the Pan-Pacific Auditorium, will occupy more space and will have more exhibitors than ever in its history in the west, according to W. H. Eisenman, secretary of the A.S.M. and managing director of the Congress.

A.S.M. Officers to Speak

One of the speakers at the technical meetings will be Dr. O. E. Harder, president of The American Society for Metals and assistant director, Battelle Memorial Institute, Columbus, whose subject will be "The Physical Metallurgy of Bearing Metals".

Bradley Stoughton, national vice-

(Continued on page 2)

A. S. M. Nominating Committee Appointed

IN ACCORDANCE with the constitution of the American Society for Metals, President Oscar E. Harder has selected a nominating committee from the list of candidates submitted by the Chapters as follows:

John W. Harsch, Leeds & Northrup Co., Philadelphia, Pa. (Philadelphia Chapter), Chairman.
Henry J. Fischbeck, Pratt & Whitney Aircraft, East Hartford, Conn. (Hartford Chapter).
Arthur E. Focke, Diamond Chain & Mfg. Co., Indianapolis, Ind. (Indianapolis Chapter).
W. R. Frazer, Union Twist Drill Co., Athol, Mass. (Springfield Chapter).
H. S. Jerabek, School of Mines and Metallurgy, University of Minnesota, Minneapolis, Minn. (North West Chapter).
Carl R. Whittemore, Deloro Smelting & Refining Co., Ltd., Deloro, Ont., Canada (Montreal Chapter).
C. R. Wiggins, Northwestern Steel & Wire Corp., Sterling, Ill. (Rockford Chapter).

This committee will meet during the third full week in the month of May, and shall name one candidate for each of the following offices:

President	1 year	Treasurer	2 years
Vice-President	1 year	Two trustees for	2 years each

The committee will welcome suggestions for candidates in accordance with the Constitution, Article IX, Section 1 (b), which provides that endorsements of a local executive committee shall be confined to members of its local Chapter, but individuals of a Chapter may suggest to the nominating committee any candidates they would like to have in office. Endorsements should be sent in writing to the chairman or other members of the committee.

British Specification Can Be Adapted to Canadian Production

Reported by H. R. Willmott
Engineer, Northern Electric Co.

Montreal Chapter—During the fifth monthly meeting of the season, held Feb. 3 at the Windsor Hotel, the chairman announced that the membership of the Chapter now exceeds 300.

The coffee talk period was devoted to showing the film entitled "The World's Best Electrical Workshop", by courtesy of Canadian General Electric Company.

The subject for the technical session was "Light Alloy Castings", by A. E. Cartwright, metallurgist of The Robert Mitchell Co., Ltd., Montreal.

The speaker dealt with the metallurgy and production of aluminum and magnesium alloy castings with particular emphasis on high duty, heat treated aluminum alloys being currently supplied to the Canadian aircraft industry.

It was pointed out that great diversity of alloys and specifications exists in Great Britian for aeronautical construction, but that designs transferred from British to Canadian production are utilizing, by substitution, alloys standard in Canadian practice based upon equivalent mechanical properties. This plan has resulted in minimum delays in war-time production schedules.

Foundry practice and metallurgy for the production of X-ray inspected castings were discussed, special emphasis being given to proper melting, gating, feeding, chilling and pouring methods.

Solution and precipitation heat treatment of aluminum and magnesium alloys was considered and the effect of residual stresses in heat treated castings referred to.

Contrasting features in melting, fluxing, and foundry practice for magnesium alloys were described and stress laid upon the necessity for careful casting design.

A considerable number of questions were asked and ably answered by Mr. Cartwright. The speaker was tendered a vote of thanks by H. J. Roast.

Detroit Concludes Lecture Course on Plastic Working

Reported by Walter G. Patton
Climax Molybdenum Co.

Detroit Chapter—More than 200 members were on hand for the February technical session to hear a talk presented by E. V. Crane, engineer and consultant of the E. W. Bliss Co. The subject of Mr. Crane's talk was "Metal Flow Theory in Plastic Working of Metals".

His talk (which has been reviewed in a previous issue) ties in with the Detroit Chapter's educational lecture program for this year. These meetings are convening on Tuesday evenings at the University of Detroit commencing Feb. 25 and concluding March 25.

The series of five lectures is being given by Dr. George Sachs of the metallurgical department, Case School of Applied Science in Cleveland, on the subject, "Plastic Working of Metals".

Compliments

To Paul Dyer Merica, vice-president, International Nickel Co., on receipt of the platinum medal of the British Institute of Metals in recognition of "distinguished services to non-ferrous metallurgy".

To Duncan P. Forbes, president and general manager, Gunite Foundries Corp., on nomination as vice-president of the American Foundrymen's Association; also to James G. Coffman, plant manager, Los Angeles Steel Casting Co., and R. J. Allen, metallurgist, Worthington Pump & Machinery Corp., on nomination for directors of the A.F.A.

To the North West, Columbus and Baltimore Chapters A.S.M. on their sponsorship of the radio broadcast on "Progress in Metals During 1940".

McGar Speaks on Copper

Reported by Warren H. Williams
Student, Penn State College

Penn State Chapter—A talk by B. H. McGar, assistant director of research, Chase Brass and Copper Co., Cleveland, on Feb. 13 covered the history of copper and its alloys, general methods of manufacture, physical properties, and its fields of applications.

Preceding Mr. McGar's talk, Student President John Conte presided over a short business meeting concerning the selection of one of the Chapter's senior members as a nominee to the National Nominating Committee.

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Modern Alloy Irons Have High Fatigue Strength Says Sefing

Reported by D. M. Horner
Control Supervisor, Harrisburg Steel Corp.

York Chapter—F. G. Sefing of the International Nickel Co. spoke on Jan. 15 on "Modern Cast Irons".

Improved foundry practice and the use of alloys permits the manufacture of cast irons developing up to 85,000 psi. tensile strength while still retaining their traditionally excellent casting properties, machinability, and resistance to wear and corrosion.

Internal structure is more important than chemical analysis in securing wear resistance. An even pearlitic structure with equal distribution of graphite in long thin strings and a minimum of free ferrite is best.

Fine dendritic graphite is undesirable for wear applications since it may permit galling, while it is thought possible that free ferrite spots may pull out of the iron under severe service conditions, and act as an abrasive grit.

Notch fatigue strengths considerably in excess of those for steel of the same tensile strength are developed by modern alloy cast irons, notably nickel-molybdenum irons. Advantage is taken of this property in cast iron crankshafts.

Cast iron's property of damping vibrations to one quarter to one tenth of the amount similarly encountered in steel is also finding many modern applications.

High alloy cast irons such as Ni-Resist, Silal, and Nicrosilal are used to resist growth and scaling at high temperatures, while these and others are used for specific corrosion applications requiring resistance to salt and salt water, alkalies, and sulphuric acid.

Nickel widens the carbon and silicon ranges permissible for securing high tensile cast irons.

Nickel and silicon both tend to reduce the chilling effects whereas chromium, manganese, and vanadium increase chilling. Molybdenum and copper do not greatly affect the amount of chill.

These effects are of great importance since increased chill causes increased machining costs.

Chemical composition of cast iron can be controlled within ranges comparable to those of steel, by control of all factors governing cupola operation, such as coke size, stock size, height of coke before charging, temperature of blast, proportions of charge and tapping intervals.

Chicago Chapter Presents Metallurgical Inspection Course

Government Inspectors in the Making in Chicago.

Reported by B. E. Sandell
Chief Chem. and Met., Stewart Die Casting Corp.

Chicago Chapter opened the first in a series of nine lectures on "Metallurgical Inspection" on Jan. 30.

This lecture course is sponsored by the Chapter for the purpose of lending A.S.M. support to the training of Government material inspectors in the Chicago Ordnance District. The course is free to all Government inspectors and their attaches, and may also be attended by members of the Chicago and Calumet Chapters.

All the lectures are given in the Auditorium of the Peoples Gas Light and Coke Company. The schedule is as follows:

Jan. 30—The General Properties of Metals; J. Walter Scott, Western Electric Co.
Feb. 6—Tensile Properties of Metals; J. J. Kanter, Crane Co.
Feb. 20—Tensile Testing & Testing Machines; Alfred Sonntag, Riehle Testing Machine Div.
Feb. 27—Hardness and Impact Tests; H. B. Knowlton, International Harvester Co.
Mar. 6—Visual and Microscopic Inspection; H. A. Anderson, Western Electric Co.
Mar. 20—Microstructure; L. F. Lottier, Peoples Gas Light & Coke Co.
Mar. 27—Heat Treatment; R. G. Roshong, Lindberg Steel Treating Co.
April 3—Chemical Composition, S.A.E. Steel Classification, etc.; F. C. Smith, Carnegie-Illinois Steel Corp.
April 17—General Review; F. J. Robbins, Bliss & Laughlin, Inc.

Hartford Inspects Ampco Metal Plant Via Colored Movies

Reported by J. T. Ballard
Salesman, Quaker Chemical Products Corp.

Hartford Chapter turned out in good force to hear an excellent talk on "Modern Bronzes and Their Applications" by W. B. Scott, sales engineer of Ampco Metal, Inc. Mr. Scott, a graduate of Metallurgical Engineering School, Case School, and Babson Institute, has had a wide experience in steel and bronze mill production.

With the aid of a fine colored moving picture, he took his audience on a trip through the vast Ampco plant and made special reference to those features most interesting to a metallurgically minded group. Later, Mr. Scott amplified these special references by stereopticon slides with a running lecture.

Considerable interest was shown by his listeners in the discussion of centrifugal casting as done at Ampco. Technical slides brought out grain structure and tensile strengths.

A fast moving question period brought out more interesting data, viz: Stamping dies made of aluminum bronze give better finish to stainless steel stampings due to less galling of the dies. Safety, non-sparking tools made of beryllium copper can be heat treated to a Brinell hardness of 400.

The coffee talk period was given over to some exceptional moving pictures showing highlights of the Russian invasion of Finland and the Nazi invasion of France, climaxed by the tragic evacuation of Dunkirk by the British.

Tentative Program for Western Metal Congress in Los Angeles May 19 to 23

(Continued from page 1)

president and professor of metallurgy, Lehigh University, Bethlehem, Pa., will have for his topic, "How Metals Behave at High Temperature", a paper of great interest to aviation and oil industries.

Three comprehensive lectures on aluminum as used in airplane construction, general manufacturing and other purposes will be delivered on as many respective days by Kent R. Van Horn, A.S.M. treasurer and research metallurgist of Aluminum Co. of America, Cleveland. He also will deliver a special paper on "The Internal Stresses of Aluminum Alloy Forgings and Castings".

Four of the Society's trustees also will speak. They are James P. Gill, chief metallurgist, Vanadium-Alloys Steel Co., Latrobe, Pa.; M. A. Grossmann, chief metallurgist, Chicago district, Carnegie-Illinois Steel Corp.; H. J. French, in charge of alloy development, International Nickel Co., New York, and E. L. Bartholomew, metallurgist, United Shoe Machinery Corp., Beverly, Mass.

Mr. Gill will deliver three papers on "Tool Steels and Machinability"; Dr. Grossmann, four lectures on "Heat Treatment of Metals".

Four lectures on alloy steels are programmed for Mr. French, while a talk of particular interest for foundrymen, "The Heat Treatment of Cast Iron", is set for Mr. Bartholomew.

Numerous other technical talks are on the society's program. A. W. Winston, metallurgist of Dow Chemical Co., Bay City, Mich., is preparing two lectures on magnesium alloys; Ray Bowden, manager, metallurgical division, Carnegie-Illinois Steel Corp., Chicago, will speak on "The Role of the Metallurgist in the Production and Use of Alloy Steels".

Four lectures on stainless steel will be delivered by V. N. Krivobok, director of structural research, Lockheed Aircraft Corp., Burbank, Calif.; "Design of Metals" will be discussed by H. W. McQuaid, chief metallurgist, Republic Steel Corp., Cleveland; and four lectures on "The Inspection of Metals" will be given by E. E. Thum, editor of METAL PROGRESS, Cleveland.

The American Welding Society program tentatively has been announced as follows:

Monday, May 19

Flame Machining, by G .V. Slottman, Air Reduction Sales Co., New York.

Union-Melt Process in Ship Building, by H. C. Bell, Linde Air Products Co., Los Angeles.

All-Welded Ships, by L. W. Delhi, Western Pipe and Steel Co., San Francisco.

Tuesday, May 20

Welded Pressure, High-Temperature Steam Piping, by F. C. Fantz, Midwest Piping and Engineering Co., St. Louis.

Resistance Welding, by F. A. Hurcomb, Taylor-Winfield Co., Warren, O.

Welding of Stainless Steel in the Aviation Industry, by V. N. Krivobok, Lockheed Aircraft Corp., Burbank, Calif.

Wednesday, May 21

Training of Welding Operators, by T. B. Jefferson, editor, *Welding Engineer*, Chicago.

Electrode Coatings and Their Uses, by John Tinnon, vice-president, Metal & Thermit Co., New York.

Codes and Specifications, by Turner Smith, General Petroleum Corp., Los Angeles.

Thursday, May 22

Welding Construction and Design of Landing Gears, by A. F. Ward, University of California, Berkeley.

Arc Welding of Chrome-Moly Tubing and Plates in Aircraft Industries, by C. J. Gallant, North American Aviation Co., Los Angeles.

X4130 — Practical Application in Tubular Structures of Aircraft, by Francis Stevenson, Vega Airplane Co.

Speakers for "Foundry Day", May 23, scheduled by American Foundrymen's Association, include C. H. Lorig, Battelle Memorial Institute, Columbus, subject unannounced; E. K. Smith, Electro Metallurgical Corp., Detroit, "Heat and Wear Resistant Cast Iron"; and V. A. Crosby, Climax Molybdenum Co., Detroit, "Plain and Alloyed Cast Iron". Several other foundry speakers will be announced soon.

Shows How Alloy Steels Influence Industrial Trends

Baltimore Chapter—How alloy steels influence modern industrial development was discussed by D. A. Nemser, metallurgist, Development and Research Division, the International Nickel Company, Inc., on Feb. 17, at the Engineers' Club.

Mr. Nemser gave a general description of the usefulness of nickel alloy steels of the structural, carburizing and direct hardening types.

In speaking on fatigue failures and the influence of several factors upon the endurance limit of steels, he pointed out that it is well known that decarburization and sharp fillets and notches reduce the ability of steel to withstand alternating stresses. In the past few years, it has been found that cold working the surface of the steel improves the fatigue limit.

Examples of commercial use of this principle include shotblasting the surface and rolling threads and fillets in bolts and shafts.

Chapter Founding 22 Years Ago Revived At Officers' Night

Reported by C. A. Nagler
Instructor, University of Minnesota

North West Chapter — National Officers Night was held Jan. 6, on the campus of the University of Minnesota.

Dinner was served to some 50 members and was followed by comments from Chapter Chairman H. S. Jerabek, President Harder, and Secretary Eisenman.

The technical session was held in the spacious men's lounge of the Union. Dr. Harder spoke on "Physical Metallurgy of Bearing Metals".

Before the technical session started Bill Eisenman was called upon to tell about the state of the Society and the progress that A.S.M. has made.

By way of reminiscence Bill read an article he had written some 22 years ago describing the formation of the North West Chapter. Some of the members present on National Officers Night had attended the first meeting, among them Secretary-Treasurer Alexis Caswell who has served the Chapter since its formation.

The trip up to Minneapolis was like coming home to Dr. Harder for he served for many years as professor of metallography at the University.

At the close of Dr. Harder's talk pictures of the 1940 Minnesota Golden Gopher football team were shown.

Mahoning Valley Members Hear Vilella and Harder

Reported by D. J. Curtin
Metallurgist, Youngstown Sheet & Tube Co.

Mahoning Valley Chapter members were privileged to hear J. R. Vilella discourse on the subject of grain size at the January meeting held at the Youngstown Y. M. C. A.

The various methods for determining grain size were discussed and evaluated, together with the etching techniques required. A very lively discussion followed Mr. Vilella's talk and it was apparent that Mr. Vilella had sown a few seeds in the minds of many Valley metallurgists.

On February 11, National President Harder visited the Chapter. He was welcomed by well over 100 members and friends.

After dinner Dr. Harder presented a paper on "Advances in Physical Metallurgy". Starting with Sorby's first use of the microscope metallurgically, Dr. Harder took his audience on up through the years to the present day, discussing the ferrous and nonferrous materials, their development and importance.

Protective Coatings Topic Of 2nd Educational Series

Reported by H. R. Boatman
Metallurgist, Inland Steel Co.

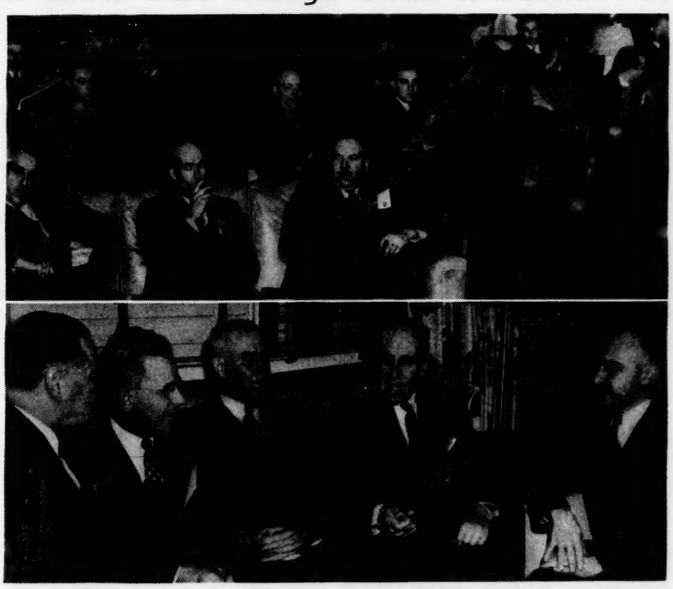
Calumet Chapter sponsored a series of three educational lectures on "Protective Coatings" during the month of February. These covered: (1) Hot dip coatings, (2) electrolytic coatings, and (3) plastics.

The lectures were by E. D. Martin, of the Inland Steel Co.

A new scheme was tried this year in the Chapter's educational activities. A series of three lectures was given during November on gas, electric, and fusion welding. Following the February series on protective coatings, a third series in April will cover "Spectrographic Analysis".

The educational program handled this way has attracted much attention, and thus far has had a very satisfactory attendance.

Officers Talk Things Over at North West



National Secretary W. H. Eisenman; R. L. Dowdell, Professor of Metallography, University of Minnesota; National President O. E. Harder; Alexis Caswell, Secretary-Treasurer of the North West Chapter; and Chairman H. S. Jerabek Discussing Attendance Identification Cards Used for Chapter Meetings. Above: A Small Portion of the Luxurious Coffman Memorial Union Men's Lounge Where North West Chapter Meetings Are Held.

Norwood Stresses Effects of Columbium, Titanium and Nitrogen in Stainless Talk

Reported by Philip C. Rosenthal
University of Wisconsin

Milwaukee Chapter—Stressing in particular the effects of columbium, titanium and nitrogen, S. M. Norwood, metallurgical engineer for the Electro Metallurgical Co., spoke on the subject of "Stainless Steels" in February.

Mr. Norwood prefaced his remarks on these elements with a brief outline of the effects of other additions to stainless steels and pointed out the factors that must be considered when selecting an alloy from the more than 57 varieties on the market.

Columbium and titanium are added to stainless steels because they unite more actively with carbon than does chromium. Their carbides have a selective temperature range of 1500 to 1600° F. in which they precipitate. To get the best results for a particular carbon content, ratios of 4 to 1 titanium to carbon and 8 to 1 columbium to carbon are recommended.

The ratio must be increased somewhat if the material is not heated within the desired precipitation range.

Nitrogen Increases Hardness

Nitrogen has been found to increase hardness without a proportionate decrease in toughness or corrosion resistance when it is added to stainless steels of the cutlery type. Non-hardenable stainless can also be improved in impact and other physicals when nitrogen is added.

Another advantage of nitrogen is its elimination of low temperature brittleness such as occurs in 25% chromium steels at around 475° C. Somewhat better results in this respect are obtained by an additional 2 to 3% nickel, which also improves impact properties.

Nitrogen can be added to the bath as high nitrogen ferrochrome, this being the final addition before pouring.

When stainless steels are to be cold worked to improve the physical properties, better results are obtained with the 17-7 composition than with 18-8. With a given amount of cold work the 17-7 steels will show a better yield stress in tension and compression, and for a given tensile strength the 17-7 steels show better ductility than 18-8.

Elastic properties of the cold-worked austenitic steels are materially improved by a low temperature heat treatment at 200° C., without affecting the ductility or the endurance limit. Furthermore, this heat treatment does not materially affect the ultimate strength nor the corrosion resistance, and the temperature is low enough to prevent formation of scale and thus eliminate the necessity for pickling after heat treating.

The coffee talker, Dr. Theodore W. Bauer, professor of history at the University of Wisconsin Milwaukee Extension, spoke on "Japanese-American Relations".

Strength, Heat & Oxidation, Wear, Major Problems Of Automotive Castings

Reported by James C. Erickson
Deere & Co.

Tri-City Chapter—At a joint meeting with the Quad-City Chapter of the American Foundrymen's Association, Garnet P. Phillips, chief metallurgist, Automotive Foundry Division, International Harvester Co., Chicago, addressed 200 members and guests on Feb. 11. His subject was "Automotive Castings."

The three major problems encountered in the production of automotive castings were listed by Mr. Phillips as: (*a*) Strength, (*b*) heat and oxidation, (*c*) wear.

It was pointed out that strength problems can be solved by changes in design or material or the use or change of heat treatment.

Heat and oxidation problems can be solved by use of suitable alloy irons and by design changes incorporating increased cooling, prevention of local overheating, etc.

Wear problems are met by the use of irons of suitable structures and with hardnesses ranging from Brinell 170 to over 500.

The 150 members and guests attending the dinner were entertained by a coffee talk by Brig. Gen. Norman F. Ramsey, commanding officer, Rock Island Arsenal.

Vapor Phase Metal Coatings Of Three Types

Reported by J. W. Poynter
Asst. Met., Army Air Corps, Wright Field

Dayton Chapter—An instructive talk on a new subject, "Vapor Phase Protective Coatings", was given by Bruce W. Gonser, supervisor of the Non-Ferrous Division of Battelle Memorial Institute, before the February meeting.

Vapor phase coatings may be applied by evaporation or condensation of the metal vapor, by decomposition of carbonyls, or by decomposition of volatile halides. Under some conditions a pure metal coating is obtainable; other conditions give an alloy coating with the base metal by diffusion.

The evaporation method is carried out in a vacuum and is used for coating telescope mirrors, plating sealed beam headlights, giving non-metallic or electro-conductive coatings.

Hot Filament Used for Light Alloys

The light metals, such as aluminum and magnesium, are particularly easy to vaporize by use of a hot filament. The heavier metals with high boiling points, such as gold, platinum and silver, are more easily vaporized by cathodic sputtering.

The Mond process of nickel refining is a good example of deposition by decomposition of carbonyls. In this process nickel oxide is reduced to sponge nickel by the action of hydrogen at 300°C. Carbon monoxide is then passed over the sponge nickel at low temperatures and the resulting carbonyl is decomposed on nickel shot at 150°C.

As another example, iron powder of exceptional purity is made by decomposition of iron carbonyl.

The decomposition of volatile halides offers the most interesting commercial possibilities of these methods. Aluminum, antimony, copper, chromium, tin, silicon, tungsten, columbium and tantalum are among the metals that can be plated by this method.

Process for Silver Described

In most cases the chloride of the metal is the halide used. Hydrogen may be passed over the halide to act as a carrier and effect decomposition. Metallic zirconium is prepared by decomposing zirconium iodide vapor on a hot filament.

An interesting related process which was briefly described is the application of silver to metallic and non-metallic surfaces. Solutions of a silver salt and of formaldehyde are simultaneously sprayed on the surface to be coated by the metallic silver. The silver is reduced from its salt by the formaldehyde and makes an effective, electro-conductive coating.

After discussing metal coatings by replacement from the vapor phase, Dr. Gonser described some new developments in depositing tin on copper-base articles by replacement. Another development is a process in which a coating containing 60% copper and 40% tin (white bronze) may be electrodeposited in one operation.

An announcement was made that the annual Tri-Chapter meeting of the Columbus, Cincinnati and Dayton groups would be held at the Engineers Club, Dayton, on Wednesday, April 16, on the subject "Tools and Tool Steels".

Empirical Nature of Physical Testing Is Stressed by Templin

Reported by F. R. Nagley
Associate Engineer, Navy Department

Washington Chapter—R. L. Templin, chief engineer of tests, Aluminum Co. of America, presented an instructive talk on the interpretation of results obtained from the physical testing of metals on Jan. 13.

Having introduced his remarks with slides showing certain types of physical testing equipment, he proceeded to discuss the effects of variables encountered during the systematic deformation of test specimens.

Possibly the property most frequently accepted as an absolute quality, and one which is purely empirical, is elongation. It was shown that the proper interpretation of elongation observations involves consideration of the design of the tensile specimen and the gage length measured.

Another property, the empirical nature of which is usually not considered, is the elastic limit or proportional limit. This property is affected by numerous factors such as machining and straightening of the specimen, non-axial loading, and the scale units selected for plotting the stress-strain diagrams.

An appreciation of the empirical nature of physical deformation measurements becomes more important as data on compression testing are interpreted. Mr. Templin presented slides showing elastic hysteresis curves obtained from alternately stretching and compressing test specimens beyond the elastic limit.

It was shown that the modulus of elasticity of a particular material changes as alternate tensile and compressive stresses are applied.

The talk was concluded with a discussion of various types of specimens being employed in studying the physical properties of metals under compression. The right-cylinder specimens and the sheet-pile or laminated specimens are the types most commonly used.

Gases for Ferrous & Non-Ferrous Bright Annealing Reviewed

Reported by H. R. Boatman
Metallurgist, Inland Steel Co.

Calumet Chapter—Modern controlled atmosphere furnaces and their operation were the subject of a very competent discussion by William Lehrer of Surface Combustion Corp. at the meeting on Jan. 21.

Mr. Lehrer reviewed briefly the atmospheres required for non-ferrous and ferrous bright annealing and for the prevention of decarburization during the heating of steels.

He pointed out that most non-ferrous heating can be done with an open flame and a slightly reducing atmosphere. However, for bright annealing steels, a muffle or radiant tube furnace is required.

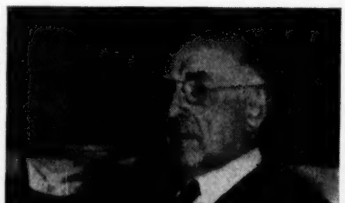
The atmosphere obtained by partially burning the fuel with a deficiency of air and then dehydrating proves satisfactory for bright annealing steel, although this gas will, under certain conditions, decarburize steels of as low as 0.15% carbon.

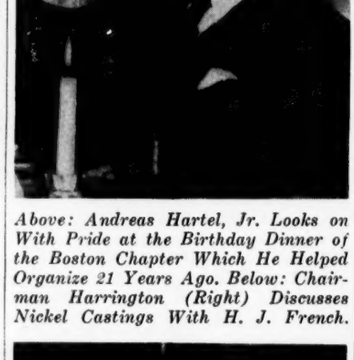
To prevent decarburization, methods are required which will greatly reduce the CO_2 and water vapor content of the gases, while the chromium and silicon steels require an atmosphere containing no oxygen-bearing gases, as provided by cracking ammonia.

In conclusion, typical gas units and furnace designs were discussed and illustrated, and Mr. Lehrer proved himself well able to withstand the question barrage which followed.

For the evening's coffee talk, Sydney Nashner reviewed the A.S.M. Metals Handbook, and called the members' attention to certain information which he regarded as of special value and interest.

Birthday Celebrated





Above: Andreas Hartel, Jr. Looks on With Pride at the Birthday Dinner of the Boston Chapter Which He Helped Organize 21 Years Ago. Below: Chairman Harrington (Right) Discusses Nickel Castings With H. J. French.

Four Charter Members Attend; French Is Speaker

Reported by R. G. Sault
Vice-President, Porter Forge & Furnace, Inc.

Boston Chapter celebrated its 21st birthday on Feb. 7 with an anniversary dinner graced by four of the charter members of the Chapter; namely, Prof. I. H. Cowdrey, A. Hartel, Jr., H. B. Parker, and L. H. Wetherell. Other charter members include A. O. Fulton and L. D. Hawkridge who were unable to attend.

Fully 250 members and guests attended the meeting following the dinner which had as its prelude a moving picture outlining manufacture and uses of "Neoprene", the chemical rubber.

H. J. French of the International Nickel Co., speaker of the evening, started his talk on "Recent Progress in Alloy Constructional Steels" by stating what he believed to be the greatest developments in the steel industry during the last five years. These were:

1. Grain size control.
2. Greater use of alloying materials.
3. Atmospheric control in heat treating.
4. New processing of alloy steels such as flame hardening, etc.
5. Acceptance of alloy steels by practically all major industries.

His enlargement on these five points was both startling and enlightening as attested by the enthusiastic question period following his talk.

Surface Finishing by Broaching Explained

Reported by K. Siems
Sales Engineer, Cincinnati Milling Machine Co.

Cincinnati Chapter—For the second time in as many months identical circumstances prevailed for the Machinability Group February meeting. The chairman of this meeting was again called out of the city, and the scheduled speaker, Mr. Bohle, chief engineer of the Illinois Tool Works, was unable to come on account of illness. Your reporter was again asked to handle the proceedings, and was fortunate enough to obtain as "pinch hitters" Millard Romaine, general sales manager of The Cincinnati Milling Machine Co., and George Squibb, sales engineer, who spoke on "Surface Broaching as Applied to High Production".

Mr. Romaine pioneered in the idea of finishing surfaces by broaching, and many of the features and basic principles embodied in designs and tooling of the machines built by The Cincinnati Milling Machine Co. today were first formulated in his mind.

Photographs of many splendid examples of machines and tooling were shown, culminating in the shipment recently of the largest horizontal surface broaching machine yet produced.

This has an over-all length of approximately 36 ft., requiring 191 h.p. to operate the ram, and exerting a pressure of 525 psi. against the piston. Production obtained is 60 six and eight-cylinder blocks an hour machined complete on top, bottom and sides.

Skill Required for Metallizing; Recent Developments Told

Reported by J. W. McBean
Central Technical School

Ontario Chapter—An interesting talk on "Metallizing" by A. van Winzen of the National Research Council at Ottawa gave a clear picture of recent developments in metal spraying.

Preparation of the surface for metallizing is extremely important, and sandblasting is generally used. It is important to have a rough surface, which prevents the formation of a continuous air film, thus allowing the metal particles to come in contact with the surface without interference. The right kind of sand is important, and the air used should be dry and free from oil.

Graphs were used to show the effect of abrasive flow rate on efficiency, of air pressure on abrasive rate, of angle of impact and working distance on abrasive rate, and the relation of power consumption to blast pressures.

Others showed the effect of spraying distance on porosity, specific gravity and hardness, and of spraying conditions on hardness, wear, and expansion of coatings.

From these it was evident that a number of factors have a great effect on cost or efficiency, or both. For instance, a steady pressure is desirable, of about 30 psi. The angle of impact for best results depends on the material which is being sprayed.

The quality of the coat depends greatly on the skill of the operator. The specific gravity of the coat is less than that of the base metal, but by proper procedure the cavities may be made non-continuous, and in some cases the coat may be made less permeable by burnishing, scratch-brushing, or buffing.

The porosity is sometimes helpful as, for instance, in holding coats of paint or resins firmly and resisting their removal by abrasion. Sometimes the pores are filled by chemical treatment, with excellent results for corrosion protection.

In addition to its value for corrosion resistance, the process is finding large use in building up worn parts, in enlarging castings for use as patterns, and for bearing surfaces where porosity is helpful in holding oil.

An interesting use is in combination with welding in repairing complicated castings such as cylinder blocks, where welding alone would produce serious stresses and probably new cracks. To avoid stresses and to secure strength, spots only are welded and the balance filled up with the sprayed metal.

It is also a useful tool in repair work where the heat of welding would result in undesirable grain growth, and in such work as recoating welded galvanized metal.

Apprenticeship Encouraged by Federal Effort

Reported by Jack I. Medoff
Physical Metallurgist, Worthington Pump Co.

New York Chapter—An important but comparatively little publicized program of industrial personnel development was brought to the attention of the membership, when Richard B. Brown, Sr., apprenticeship field representative, U. S. Dept. of Labor, spoke on the federal apprenticeship program.

This work had its inception in 1934 when the effort to promote recovery through the N.R.A. made it clear that our skilled workers would have to be trained in a less haphazard fashion than in the past, and because of the belief that apprenticeship was the only dependable method of developing an adequate supply of skilled mechanics for future industrial and national defense needs.

Committee Created in 1934

The Federal Committee on Apprenticeship was created by the Secretary of Labor in June 1934. Its stated objectives were to encourage apprentice training under the then-existing N.R.A. codes, to prevent the exploitation of apprentices and maintain labor standards, to insure all-round adequate training and to relate the number of apprentices trained to future needs.

As the work progressed, the recognition that apprenticeship was more than an emergency problem, and deserved a more permanent position in our industrial set-up, resulted in congressional approval in 1937 for putting the program on a long-time basis.

The speaker concluded that the value of this type of training has been very favorably demonstrated by the personal experiences of many companies; that skilled workers can only be developed by actual work on the job, and that this must not be left to chance or the unguided initiative of the beginner, but must be directed by efficient planning.

Coffee Talk on Armor

An interesting coffee talk on "Arms and Armor" was ably presented by Stephen V. Grancsay of the Metropolitan Museum of Art, whose collection is reputed to rank 6th in world importance.

It was amusing and enlightening to learn that armor does not clank but can be worn rather quietly and that it is only a matter of minutes to get into or out of a complete suit of armor.

The piece de resistance was Bill Prinz's comment on the unusually high scleroscope hardness values found for these ancient pieces, attributing the results to "age" hardening.

Coining, Drawing and Spinning Discussed Under 'Plastic Work'

Reported by G. E. Burkhardt
Engineer, General Railway Signal Co.

Rochester Chapter — "The Plastic Working of Metals" was the subject of a talk given at a joint meeting with the American Society of Tool Engineers on Jan. 15 at the University of Rochester.

William Evarts, staff engineer of the E. W. Bliss Co., prefaced his remarks with the statement that very few technical schools cover the working of metals in the plastic range. Engineers in general are interested in the working of materials below the elastic limit, whereas processes such as coining, drawing, and spinning, are done above the elastic limit, in the so-called plastic range.

Coining, one of the oldest operations that makes use of the plastic flow of metals, was discussed, and modern equipment such as hot strip mills, cold rolling mills, skin pass mills, and deep drawing presses was shown by means of slides.

A good demonstration and explanation of the changes that take place in the atomic structure of metals plastically worked was given.

A pertinent point brought out by Mr. Evarts was that the actual physical properties of the material, and not the engineering physical properties, are used in computing the plastic behavior of metals. The tensile strength is computed from the load and area at that load so as to obtain the true tensile strength. This true load is the load required to deform metals.

Slides of modern presses included constant velocity presses, extrusion presses and toggle presses.

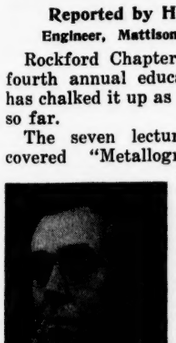
Motion pictures showed the operation of various types of presses, the control mechanisms and the resulting products.

Rockford Finishes Course On Metallography and Heat Treatment of Steel

Reported by H. E. Habecker
Engineer, Mattison Machine Works

Rockford Chapter has completed its fourth annual educational course and has chalked it up as the most successful so far.

The seven lectures in the course covered "Metallography and Heat Treatment of Carbon Steel", and outlined the development of the iron-carbon diagram and resulting effects of heat treatment on structure and physical properties.



C. R. Wiggins

C. R. Wiggins, chief metallurgist of the Northwestern Steel and Wire Co., Sterling, Ill., was the instructor. He is a graduate of Michigan State College and served on the faculty there between 1922 and 1924. He has since been employed by Buick Motor Co., Interstate Iron and Steel Co., and Republic Steel Corp.

At the conclusion of the course Mr. Wiggins was presented with a traveling bag by those enrolled. The presentation was made by Phil Carbaugh, chairman of the Educational Committee.

The courtesy of the Central Illinois Electric and Gas Co. in furnishing their auditorium for the meetings is much appreciated by the Chapter.

375 Attend Los Angeles Testing Course

D. S. Clark, Assoc. Prof. of Mechanical Engineering at Caltech, Teaches With Blackboard and Microphone.

Reported by R. Lowry
Metallurgist, Hydril Co.

A series of eight lectures entitled "Physical testing of Materials" is being presented each Monday evening at Culbertson Hall, California Institute of Technology, under the auspices of the Los Angeles Chapter, American Society for Metals. D. S. Clark, associate professor of mechanical engineering at Caltech, is the lecturer.

These lectures are creating widespread interest, the last one being attended by approximately 375 members, students, inspectors and others. A charge of $3.00 to members and $5.00 to non-members includes mimeographed copies of lectures in attractive loose-leaf binder.

This activity is in line with many chapter educational courses being given with an eye to aiding the national defense program.

Detroit Probes Inner Structure of Metals At January Meeting

Reported by W. G. Patton
Engineer, Climax Molybdenum Co.

Detroit Chapter probed deep into the very heart of metals at its January meeting. What it found was a highly involved atomic system that undoubtedly responds in a predictable manner to a nod from the learned professors but is still somewhat reluctant to reveal its inner secrets to the layman.

Discussion leader for the occasion was M. F. Sayre, professor of applied mechanics at Union College, Schenectady, N. Y., and nationally recognized authority on the subject of elastic properties of metals.

The talk by Professor Sayre dealt primarily with the theory of plastic behavior of metals and their relationship to strength and strain hardening. Charts and graphs were used frequently to supplement verbal discussion, especially in dealing with some of the newer concepts of cohesive strength of metals.

Professor Sayre brought out the fact that there are three kinds of stress: (*a*) Straight tensile, (*b*) rending stress, in which there is pulling in two directions and at right angles to one another, (*c*) disrupting stress which pulls simultaneously in three directions. Failure, he pointed out, rarely comes in tension only; usually where there is a brittle break it results from stresses in several directions.

The speaker described how studies of single atomic crystals have promoted our understanding of the elastic behavior of metals. Under loading, he explained, metals are inclined to behave somewhat like a gas and their temperature may thereby be raised or lowered.

The observation was made that if metal didn't fail, it wouldn't stand up. This is a unique view of stress distribution which emphasizes the true importance of the plastic properties of metals.

The audience seemed especially interested in Professor Sayre's reference to practical applications where his special knowledge of the physical behavior of metals has enabled him to solve some difficult mechanical problems. His admonition that "saving the surface of metals may be saving all" is a well-timed warning that can be kept profitably in mind by most metallurgists and engineers.

Able technical chairman of the meeting was F. P. Zimmerli, whose ability to insert an appropriate light touch into a heavy technical discussion is always a welcome addition to a Detroit Chapter meeting.

Demand for Leaded Steel Exceeds Supply—Harder

Reported by F. N. Meyer
Technical Supervisor, Waterbury Branch American Brass Co.

New Haven Chapter had the pleasure of meeting with National President O. E. Harder on Feb. 20. His exceedingly interesting subject, "The Effect of Lead in Steel", was delivered at the Hammond Laboratory, Yale University.

The lecture was preceded by a coffee talk given by your genial friend and fellow-member, Alderman Fred Dawless.

Dr. Harder discussed the manufacture and physical properties of the leaded as well as the non-leaded steels, and exhibited a number of slides showing comparative properties of each.

At the present time the demand for leaded steels exceeds the supply, because it is not being manufactured in amounts sufficient to meet requirements.

Not the least interesting among Dr. Harder's slides were a number depicting his skill as a deep sea fisherman in southern waters.

Payson Shows Complexity of Stainless Steels

Reported by Fred P. Peters
Assistant Editor, Metals and Alloys

New Jersey Chapter — Whatever "stainless steel" *is*, in its characteristics and properties, there is one thing it *isn't*—and that is stainless!

With this made clear to his audience of 200 at the Essex House, Newark, on Jan. 20, Peter Payson proceeded to discuss these happily mislabeled products with respect to their microstructural differences and behavior, and the resulting mechanical and corrosion resisting properties.

As chief of the research laboratory of Crucible Steel Co., Harrison, N. J., Mr. Payson knows the stainless steels for the useful but complex things they are. He pointed out that a "class" definition of them is hardly possible, but one of the best general differentiations from other steels is on the basis of transformation behavior.

Phase Changes Characteristic

Thus, most steels become austenitic on heating to high temperatures, and on cooling transform to ferrite and carbide. Stainless steels as a class, however, do not follow this behavior—except for the higher carbon cutlery steels, they are either (*a*) partly or wholly ferritic at high temperatures, or (*b*) austenitic at *both* elevated and ordinary temperatures.

Mr. Payson is one of that select circle of American metallurgists who have mentally and accurately catalogued the functions and individual effects of the alloying elements in steel, and his discussion of the S-curves of several alloy steels indicated that Kearny isn't the only Hudson County town that harbors S-curve experts.

Various Types Discussed

The "stainless steels" discussed ranged from the 4 to 6% chromium, ½% moly "oil industry steels" and the 9% chromium, 3% silicon valve steels through the orthodox straight chromium and chromium-nickel stainless steels up to the high chromium (27%) chromium-iron alloys.

Some are widely used for their resistance to specific corroding media, others for their strength at high temperatures, others for their oxidation resistance, and still others for their structural strength in room-temperature service. The obvious reason for many applications is the lasting beauty of the bright surface during ordinary exposure to the atmosphere.

Sigma Phase Found Useful

It was interesting to learn that the sigma phase has become more than the plaything of theorists. This phase imparts hardness and wear resistance to certain stainless steels in which it can be developed (by a high temperature treatment), and is responsible for the excellent service performance of a new valve steel containing 25% chromium, 5% nickel, 3% molybdenum and 0.40% carbon.

A mysterious structure has also been encountered in very high chromium, high nickel steels (24-20, etc.), which Mr. Payson informally calls "Hodappite" after its discoverer and his colleague, W. Hodapp. The structure, which has been noted in such steels that have failed in high temperature service under both carburizing and non-carburizing conditions, cannot be identified as any of the known constituents of these alloys, and still eludes satisfactory explanation.

Helpful Literature — Mail Coupon Below

Salt Bath Furnace
New 20-page Catalog describing the Ajax-Hultgren Electric Salt Bath Furnace. Gives detailed data on all heat treating applications such as carburizing, cyanide hardening, hardening carbon and high speed steel tools without scale or decarb, heat treating aluminum alloys, tempering steel products, heating for forging, brazing, etc. Bulletin Nd-43.

Refractory Cement
An economical silicon carbide cement for general service in furnace linings is described in a colorful folder released by the Norton Co. Bulletin Be-88.

Convected Air Furnaces
A brand-new, 12-page illustrated booklet full of ideas for solving your furnace problems is now available through the Despatch Oven Co. Covers many unusual features of Despatch recirculating convected air furnaces. Bulletin Nd-123.

Furnace Catalog
A 120-page catalog covering the complete line of furnaces and burners manufactured by The American Gas Furnace Co. is available to companies who request this book through THE REVIEW on their company letterhead. Bulletin Be-11.

New Cleaning Methods
Illustrated new 32-page booklet issued by Oakite Products, Inc., describes formulas, methods for safely cleaning aluminum, magnesium, zinc die castings and other metals and alloys before electroplating, cleaning polished steel, brass, copper. Also includes data on tumbling, burnishing, pickling. Bulletin Nd-296.

Mounted Wheel Chart
A convenient ready reference wall chart showing mounted grinding wheels should be of great advantage in the cleaning room, pattern shop, tool and die room, and many other places. It gives at a glance, by means of detailed drawings, actual size, the exact radius of each wheel and its exact shape. Chicago Wheel & Mfg. Co. Bulletin Bd-230.

Pocket Relationship Table
A very handy celluloid table which fits snugly in your pocket and shows the relationship between Rockwell, Brinell, and Vickers hardnesses has been prepared by Wilson Mechanical Instrument Co. Bulletin Be-22.

Thermocouple Head
Thermocouple heads and parts are covered in literature by Claud S. Gordon Co. Bulletin Be-53.

Metallographic Equipment
The 100-page "Metal Analyst" issued by Adolph I. Buehler features new Metallographic Sample Preparation Equipment; a comparative listing of Metal Microscopes, Measuring Microscopes, and Spectrographs; and index of over 1,000 new technical books and papers; and a treatise on the Application of Reflected Light. Bulletin Ed-135.

Heat Resisting Castings
A 4-page folder on Pyrasteel heat resisting castings that shows applications of special alloy steels and their analyses, also information on welding alloy steels, is available through Chicago Steel Foundry Co. Bulletin Cb-184.

Meehanite Castings
An interesting, well-illustrated 49-page booklet, "Meehanite in Industry" covering applications of Meehanite castings in a variety of industries, is now available through the Meehanite Research Institute of America, Inc. Bulletin Ce-165.

Hard Facing Alloys
For maximum resistance to wear and corrosion, the Wall-Colmonoy Corp. offers a fact-packed folder which is extremely helpful to anyone having this problem. Bulletin Kd-85.

Heat Treat Chart
Heat treaters everywhere should find a heat treating wall chart complete with S.A.E. specifications a very valuable addition to their shops. Published by Chicago Flexible Shaft Co., manufacturers of Stewart industrial furnaces. Bulletin Ka-49.

X-Ray Diffraction
A new high-precision unit for X-Ray diffraction is described in a booklet issued by the General Electric X-Ray Corp. Bulletin Ec-6.

Welding Alloys
New low temperature welding alloys which bind by eutectic low temperature reaction to give stronger joints are described in literature available through Eutectic Welding Alloys, Inc. Bulletin Be-301.

Cecostamp
A high production, impact-type stamping machine developed for forming stainless steel, thin hot work that cools quickly, embossing, and work hard to set to final shape is described in an instructive 16-page booklet by the Chambersburg Engineering Co. Bulletin Gc-132.

Potentiometer Controllers
Designed for applications requiring the utmost accuracy and sensitivity in temperature control, a complete line of potentiometer controllers is described in literature made available by Wheelco Instruments Co. Bulletin Ae-110.

Foundry Sand
A pamphlet recently issued on TAM Foundry Zircon Sand and TAM Zircon Flour contains detailed information on these products of the Titanium Alloy Mfg. Co. Bulletin Hc-90.

Magnefer
The reasons why "Magnefer" is more than "just another" clinkered dolomite are presented in an attractive folder by Basic Dolomite, Inc. Bulletin Ae-192.

Shear Knife
A handbook describing the development of the solid steel shear knife by Sam Heppenstall, founder of the Heppenstall Company. Compact, bound in imitation leather, this booklet contains valuable data in the form of hardness conversion table and shear knife performance charts. Bulletin Db-122.

Contour Machining
A new Handbook on Contour Machining containing 158 pages of valuable metal working helps is being made available by Continental Machines, Inc. Bulletin Nd-170.

Quenching Handbook
Quenching oils for every required speed, every need are described in the valuable new Quenching Handbook printed by E. F. Houghton & Co. Bulletin Ce-38.

Carbide Tools
"Firthite General Purpose Tools" is the title of a new bulletin and price list available from Firth-Sterling Steel Co. Bulletin Ae-177.

Cutting Oil
An informative booklet containing 48 pages of scientific applications for the largest selling sulphurized cutting oil is offered by D. A. Stuart Oil Co., Ltd. Bulletin Kd-118.

Recorder-Controllers
Foxboro's new booklet describes the permanent precision, low maintenance and reductions in spare-parts inventories for Potentiometer Recorders and Recorder-Controllers. Bulletin Kd-21.

N-A-X
New twenty-page, fully illustrated booklet on N-A-X high tensile low alloy steel has just been published by Great Lakes Steel Corporation. This steel has been thoroughly proved in application where ordinary high tensile steels have failed. Bulletin Kd-229.

Free Machining Steels
Speed Case and Speed Treat, two steels with increased machining properties, are described in literature available through Monarch Steel Co. Bulletin Cd-255.

Steel Data Sheets
Wheelock, Lovejoy & Co. gives analyses, physical properties, heat treating instructions, and applications of Hy-Ten, Economo, and S.A.E. alloy steels in concise and easily usable form. Bulletin Ox-74.

Petroleum Stainless
A fully illustrated 52-page, 8½"x11" wire bound handbook, covering U.S.S. Stainless and Heat Resisting Steels for the Petroleum Industry, has just been made available by the United States Steel Corp. Bulletin Hd-79.

Industrial Furnaces
Furnaces of all types are fully described in technical bulletins made available by the Eclipse Fuel Engineering Co. Bulletin Hc-226.

Welded Stainless Tubes
A really striking 16-page booklet containing 45 illustrations on Welded Stainless Tubing is offered by the Carpenter Steel Co. Bulletin Kd-12.

Rustless Handbook
Offered as an answer to the question, "Which stainless steel?", a 60-page handbook by Rustless Iron and Steel Corp. gives complete information on properties, processing, and engineering applications of a wide variety of rustless and stainless steels. Excellently arranged and printed. Bulletin Bd-169.

Heat Treating Containers
Over 300 available patterns of carburizing, annealing and other heat treating containers are listed in a Data Book made available by the Michiana Products Co. Bulletin Ce-81.

Metal Heating
Improvements in furnace economies, operating conditions and appearance, furnaces that will more satisfactorily meet old requirements or handle new processes, service that will help solve the most stubborn problems are offered and described by Mahr Mfg. Co. in Bulletin Ea-5.

Oil Burners
North American Mfg. Co. offers a bulletin describing improved low pressure oil burners, one type especially designed for automatic control and ideally suited for use with proportioning control valves. Bulletin Na-138.

Electric Furnaces
A new catalog on electric furnaces and pyrometers has been released by the Hoskins Manufacturing Company. For anyone who does any kind of heat-treating, brazing, or uses heat-resisting castings. Bulletin Hc-24.

Super Refractories
A very handsome spiral-bound 76-page catalog covering their extensive line of refractories for heavy duty service is offered by the Carborundum Co. Bulletin Ld-57.

Aircraft Heat Treating
A special bulletin "Heat Treating Furnaces for the Aircraft Industry" has just been prepared by the Lindberg Engineering Co. Bulletin Nd-66.

X-Ray Inspected Castings
All types of heat and corrosion resistant castings made with extensive use of "X-Ray Inspection" and modern foundry methods are shown and described in a 16-page two-color booklet made available by the Electro-Alloys Co. Bulletin Ld-32.

Dehumidifier
Lectrodryer systems, employing activated alumina for drying air and gases by absorption, are described in an attractively illustrated booklet by the Pittsburgh Lectrodryer Corp. Bulletin Bb-187.

Insulating Firebrick
An insulating firebrick with low weight, low heat losses, and great economy is described in detail in a new bulletin by the Babcock & Wilcox Co. Bulletin Ce-75.

Hi-Speed Furnace
An essential unit for general machine and tool shops is the Hi-Speed Steel Furnace described in literature by Johnson Gas Appliance Co. Bulletin Ae-298.

New Electric Furnace
An electric furnace that is new in every respect . . . including new insulating refractory lining, increased wall insulation, simplified door lift mechanism . . . is described in a bulletin released by the American Electric Furnace Co. Bulletin Gd-2.

Heat Treating Furnaces
A brand new 16-page booklet of Holcroft & Company shows and describes their line of controlled atmosphere heat treating furnaces. Bulletin Ec-203.

Super Refractories
A catalog of Chas. Taylor Sons Co. is replete with useful data on P. B. Sillimanite refractories for use up to 3300° F. in electric furnace roofs and linings, induction furnaces, crucible furnaces, fuel-fired hearths, piers and linings, burner blocks, etc. Bulletin Ec-218.

Combustion Furnace
Designed for ease, speed and economy in the determination of carbon in materials by the direct combustion method, without sacrifice of accuracy, the Sobers Vertical Combustion Furnace is described in detail in a new booklet by the Hevi Duty Electric Co. Bulletin Ce-44.

Industrial Carburetor
The flame characteristic most suitable for your operation is accurately supplied by the Kemp line of Industrial Carburetors which is described in a colorful folder furnished by the C. M. Kemp Mfg. Co. Bulletin Ce-219.

Rotary Hearth Furnaces
A new line of Rotary Hearth Furnaces for forging, forming and heat treating is illustrated and described in an attractive booklet released by Lee Wilson Sales Corp. Bulletin Ce-302.

Welding Ideas
Illustrating and describing a wide variety of money-saving repair, fabrication and structural applications of arc welding, a new bulletin "101 Welding Ideas for Low Cost Maintenance" is available through the Lincoln Electric Co. Bulletin Kc-10.

Conveyor Furnaces
Chain belt conveyor furnaces, their design, construction and application, are covered in a 12-page reprint of an article showing furnace details and containing over 30 illustrations of electric and fuel fired chain belt furnaces. Issued by The Electric Furnace Co. Bulletin Be-30.

Refinery Alloys
Special alloys for refineries, corrosion, temperature, and abrasion resisting are covered in a colorful folder produced by the Duraloy Co. Bulletin Kd-223.

No Decarburization
A low cost method of hardening and annealing under production conditions with no decarburization is described in technical data available through Westinghouse Electric & Mfg. Co. Bulletin Fd-134.

Metal Descaling
A process which overcomes past descaling disadvantages through a new method which removes scale completely without the slightest damage to the work is introduced in a folder by the Bullard-Dunn Process Division of the Bullard Co. Bulletin Ld-143.

Degreasers
An interesting line of portable degreasers which can be taken to the work—instead of bringing work to the degreaser—is shown and described in a colorful folder by the Phillips Manufacturing Co. Bulletin Nc-254.

Mechanical Oscillator
The Bernhard Mechanical Oscillator, which makes possible dynamic tests using artificial vibrations on units varying in size from a small specimen to a full size structure, is explained in an 8-page booklet by the Baldwin Southwark Div., Baldwin Locomotive Wks. Bulletin Ce-67.

Universal Testing Machines
A low-priced Universal Hydraulic Testing Machine for tension, transverse, compression and Brinell hardness tests is described in a pamphlet by Riehle Testing Machine Div. of American Machine & Metals, Inc. Bulletin Fc-157.

Optical Aids
Bausch & Lomb Optical Co. has issued an interesting 16-page booklet of microscopes and accessories for the metal working industries which will be very helpful to those interested in accurate inspection and analysis. Bulletin Ce-35.

Carbon Determinator
A colorful booklet describing a two-minute carbon determinator and sulphur determinator for use in accurate determination of these materials in ferrous and non-ferrous materials is available through the Harry W. Dietert Co. Bulletin Ce-198.

Remote Transmission
Remote Transmission for indicating, recording and control of temperature, pressure, flow and liquid level in hazardous atmospheres where the use of electrical transmission is not desirable nor permissible is introduced in a new booklet by the Brown Instrument Co. Bulletin Ce-3.

Abrasion Resistance
An efficient, portable testing machine for evaluating resistance of surface finishes to rubbing abrasion has been developed by the Taber Instrument Co. Bulletin Ce-303.

Carburizing Boxes
Carburizing boxes that reduce heat treating costs and possess stubborn resistance against heat-corrosion and hard service are illustrated in a folder released by The Pressed Steel Co. Bulletin Ce-269.

Tool Steel
If you produce dies, punches, or similar tools (and are using liquid-quenched steel) investigate the Air-Hardening Tool Steel produced by the Bethlehem Steel Co. Bulletin Ce-76.

Machinery Steel Selector
A handy chart giving complete physical characteristics with variations up to 8" cross-sections, machining data, etc., on the ELASTUF group of Related Machinery Steels is available through Horace T. Potts Co., Brown-Wales Co., and Beal McCarthy & Rogers. Bulletin Ed-264.

Vital Points
The ability of Ampco Metal to safeguard the vital points in industry's outstanding mechanical equipment is described in "Brief Facts About Ampco Metal", a 16-page illustrated booklet just issued by Ampco Metal, Inc. Bulletin Ld-175.

Durodi
Durodi . . . "The practical, serviceable and economical hot work steel" . . . is described in a catalog issued by A. Finkl & Sons Co. Points out uses and characteristics of this alloy. Bulletin Ib-23.

Steel Data
Ten colorful leaflets each describing a popular grade of tool or high speed steel and giving useful data, application information, etc., have just been issued by Vanadium-Alloys Steel Co. Write for Bulletin Kd-294.

Government Specifications
A handy digest of 23 Army and 17 Navy specifications for alloy steels, showing chemical analysis and corresponding SAE number for each specification is now available through Peter A. Frasse & Co., Inc. Bulletin Ce-172.

Alloy Steels
Why alloy steels are best for heavy equipment and other exacting applications is discussed in a folder by Bliss & Laughlin, Inc. A partial list of the more common grades gives machine ratings and turning speeds. Bulletin Jy-42.

Carburizer Cleaner
A machine for cleaning used carburizer so as to increase its life 50% is illustrated and described in a booklet by the Thurner Engineering Co. Bulletin Ae-300.

Deposition Rate
A graph which helps you estimate accurately quantity of electrodes needed and welding time required . . . data on Cr and Cr-Ni alloy weld metal: types of service for each grade and recommended heat treatment . . . has just been released by the Arcos Corp. Bulletin Ld-191.

Band Saws
Actual performance records of DoALL Band Saws are contained in a booklet made available by the DoALL Co., Inc. Bulletin Ae-297.

The Review
7301 Euclid Ave., Cleveland

Please have sent to me without charge or obligation the following literature. (Circle the numbers that interest you. It is important to write in your company or business connection when you return this coupon.)

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				Ld-32	Ke-10	Ce-303	Ld-191
				Bb-187	Be-30	Ce-269	Ae-297
					Kd-233		

Here and There With A.S.M. Members

BACK on the job as a part-time dollar-a-year technical expert for the United States is DEAN EMERITUS BRADLEY STOUGHTON of Lehigh University, vice-president of the A.S.M.

Two assignments have been given to Professor Stoughton. He will act as head of the Section on Heat Treating Equipment in the Office of Production Management, Advisory Committee to the Council of National Defense, and as a member of the Section on Metallurgical Problems of the National Defense Research Committee.

In World War I he was a member of the General Engineering Committee of the National Council of Defense, and head of the Metallurgical Division and later vice-chairman of the Engineering Division of the National Research Council.

The request for Professor Stoughton to head the important section on Heat Treating Equipment came from Mason Britton of the Machine Tool Division, who wrote that Professor Stoughton is "the best man in the country" to head this section because of his "thorough knowledge of equipment, industry and personnel of manufactures".

* * *

H. B. PULSIFER, known to most Cleveland A.S.M. members as "Harry", is now with American Metal Treating Co., Cleveland.

Mr. Pulsifer has been metallurgist for American Steel & Wire Co. since 1936, and spent the preceding eight years as metallurgist for Ferry Cap and Set Screw Co. He also has had an extensive teaching experience at such places as Armour Institute of Technology, Montana State School of Mines, and Lehigh University. He himself is a gradute of M.I.T. with Ch.E. and M.S. degrees from Armour Institute and University of Chicago.

Harry was chairman of the Cleveland Chapter in 1935-36.

Bradley Stoughton

H. B. Pulsifer

T. C. Jarrett

K. P. Rolston

TRACY C. JARRETT, formerly assistant metallurgist with the American Optical Co., has been appointed chief metallurgist for Koppers Co., American Hammered Piston Ring Division, Baltimore.

Dr. Jarrett received his B.S. in metallurgy from South Dakota School of Mines in 1932; his M.S. from Harvard in 1933; and his D.Sc. in metallurgy from Harvard in 1936. During 1931 and 1932 he was a laboratory instructor in metallurgy at South Dakota School of Mines. He was also an instructor in metallurgy at Harvard as assistant to the late Prof. Albert Sauveur.

He is the author and co-author of a number of technical papers for the A.S.M. and other publications and is the inventor of the Jarrett metallurgical polishing and lapping machine.

* * *

K. P. ROLSTON has accepted the position of works manager, in charge of mechanical production, with the Hunter Mfg. Corp., Bristol Pa. For the past five years he has been chief engineer with the Screw Machine Specialty Co., Pittsburgh.

The Hunter Mfg. Corp. is engaged in defense work and the Bristol facilities include equipment for the manufacture of shells and fuzes as well as loading machinery.

F. R. Palmer

W. W. Crawford

CARPENTER Steel Co. has appointed FRANK R. PALMER as vice-president in charge of sales. He was formerly assistant to the president.

A graduate of the University of Pennsylvania in chemical engineering, Mr. Palmer has been affiliated with Carpenter Steel since 1917, serving first as foreman of the electric furnace melting department and later being transferred to the metallurgical department.

He is responsible for several patents covering free-machining stainless steels, and is the author of a text entitled "Tool Steel Simplified".

* * *

HAROLD B. WYLIE, chairman of the Northwestern Pennsylvania Chapter, has resigned his post as research engineer at Talon, Inc., Meadville, Pa., to become works manager of Casco Products Corp., Bridgeport, Conn.

DIED

WM. W. CRAWFORD, 59, president of the Edward Valve & Mfg. Co., East Chicago, Ind., died in Miami Beach, Fla., on Feb. 19.

Mr. Crawford started his business career as a newspaper man in El Paso, Texas, in 1905, after attending Beloit and Oberlin Colleges.

From 1910 to 1920 he was secretary-treasurer of the Chicago City and Connecting Railways; from 1912 to 1928 secretary-treasurer and director of the Chicago Interurban Traction Co.; from 1921 to 1928 president of the McClellan Refrigerating Co.; and president of the Edward Valve & Mfg. Co. since 1923.

* * *

SIDNEY A. SHAPPI, 55, mechanical and designing engineer for International Harvester Co. at Chicago and Rock Island since 1911, died Jan. 15.

Mr. Shappi was an engineer on the Farmall tractor almost since it was conceived, and he came to the Rock Island Farmall plant 14 years ago, shortly after it was established. Recently he had been employed as engineer in the cost reduction department. He was a member of the Tri-City Chapter and divided his time between Moline and Chicago.

Largest Ingot Forged Weighed 450,000 Lb. North West Is Told

Reported by C. A. Nagler
Instructor, University of Minnesota

North West Chapter—T. P. Hughes, professor of mechanical engineering, University of Minnesota, devoted the early part of his talk on "Forging Practices, Production and Problems" at the February meeting to the historical development of forging.

The earliest forging of any size known to man was fabricated in the third or fourth century, an example being the Column of Delhi which is some 16 in. in diameter, 24 ft. long, and weighs approximately 46,000 lb. This Column is of pure iron and all indications are that it was made by hammer welding small increments of metal together.

The largest ingot forged to date weighed some 450,000 lb. The development of large forging presses and hammers has progressed along with the ability to produce large ingots.

Steam Hammer Vs. Hydraulic Press

The steam hammer is used effectively for forgings weighing between 400 and 4000 lb., while the hydraulic press is considered more efficient for forgings which require hammers of over 10,000 lb.

Forging may be done by rolling, pressing, hammering, extruding, and drawing.

Forging may be used: *(a)* On ingots to weld up holes that have not been oxidized; *(b)* to close up voids that are unweldable; *(c)* to form metal to a desired shape; *(d)* on ingots to get better distribution of elements; *(e)* to reduce or control grain size; and *(f)* to improve all-around physical properties.

Under the heading of successful forging the speaker singled out the importance of causing metal flow within die recesses by means of the dynamic application of blows to minimize the formation of flash. The presence of the chilled flash, by preventing the closing of the dies, results in oversize forgings.

The draft on drop forging dies has been decreased from 7 to 10° down to 3°, resulting in less machining, and lower cost of production without increasing the difficulties of removal of the forging from the die.

The last subject discussed by Prof. Hughes was wear on dies and working with close tolerances.

Discussion centered about filling of forging specifications, normalizing and annealing of forgings, grain size and its relation to forgeability, and close tolerances on forgings.

Prizes for Welding Papers

The American Welding Society has announced a series of prizes established by the Summerill Tubing Co., Bridgeport, Pa., to be awarded at its annual meeting in October 1941.

One prize of $300, one of $200, and others totaling $100 will be distributed for papers to advance the art of welding of aircraft steels, including tubing and other steel parts for tubular assemblies. Papers must be submitted not later than August 18, 1941.

Further information can be secured from the American Welding Society, 33 West 39th St., New York City.

Method of Evaluating Furnace Gases Given

Reported by W. B. Kennedy
Metallurgist, Columbia Steel Co.

Golden Gate Chapter was treated to a particularly interesting meeting on Feb. 17 when Norbert K. Koebel of the Lindberg Engineering Co. presented an informative talk on "Controlled Atmospheres".

The speaker's weight change method of evaluating furnace atmospheres furnished a basis for comparing the relative efficiency of different gas compositions under actual operating conditions.

The method involves a careful determination of the weight change in a sample of steel when it is exposed to a given atmosphere. Under non-oxidizing conditions an increase in weight indicates that the atmosphere is carburizing while a decrease indicates that it is decarburizing.

When this weight change was reported in terms of weight per unit area, it permitted the preparation of graphs to illustrate the effect of numerous variables. By this method Mr. Koebel was able to classify and evaluate various synthetic and commercial atmospheres and to show the effects of variations in time, temperature and steel composition.

As a companion feature a very interesting and instructive movie, "The Steel of the Ages", was presented by P. E. Thurston of the Allegheny Ludlum Steel Corp. This picture gave an insight into the manufacture of stainless steel that could only be duplicated by an actual visit to a producing mill.

Stoughton Night at Lehigh Devoted to Local Chapter Talent

Reported by R. D. Stout
Dept. of Metallurgy, Lehigh University

Lehigh Valley Chapter held its third annual Bradley Stoughton Night on Feb. 7. This meeting is traditionally devoted to Chapter talent, and this year an imposing array of brain power was assembled for a "Metallurgical Information Please" program.

Professor Stoughton presided as supreme judge, with final decision on the correctness of answers, while M. W. Dalrymple, metallurgical supervisor for the Bethlehem Steel Co., served ably as master of ceremonies. The experts were:

G. E. Doan, head, department of metallurgy, Lehigh University.

O. V. Greene, metallurgical department, Carpenter Steel Co.

C. H. Herty, development engineer, Bethlehem Steel Co.

A. D. Shankland, engineer of tests, Bethlehem Steel Co.

H. L. Day, metallurgist, Ingersoll-Rand Co.

After the dinner, Professor Stoughton presented a short coffee talk in which he stressed the important part that those in the metal industry must play in the national defense program.

The quiz program contained two types of questions, all of which were submitted by Chapter members. The first concerned subjects about which the questioner sought information. For these, the experts were allowed to prepare beforehand.

The second type was to "stump the experts" and these were submitted without rehearsal. For each of these that the experts failed to answer to the satisfaction of the judge, a $1.00 prize was awarded to the author.

The experts displayed such acumen and pedantry that but $7.00 was surrendered by the Chapter secretary. Among the prize-winners were B. S. Old, H. J. Godfrey, J. E. Croushore, J. S. Worth, and Professor Stoughton.

Appropriately, the final question required identification of slides showing such metallographic subjects as a cross-section of a carrot, a cocoanut cookie, and mud-cracks in a clay putting green.

McCarthy Talks on Color Metallography, Wire Manufacture

Reported by J. W. McBean
Central Technical School

Ontario Chapter—A talk on metallography of steel and steel wire in colors, by B. L. McCarthy of the Wickwire Spencer Steel Co., together with a discussion on recent trends in the manufacture of spring wire, formed a very interesting January meeting.

The paper took up recent work in the use of polarized light and sensitive tint illumination in the analysis of steel microstructures, and was illustrated by many colored slides.

In a coarse-grained pearlitic carbon steel rod, with 0.6% carbon, the pearlitic grain boundaries were shown much more clearly by the polarized light than by ordinary illumination.

Using sensitive tint illumination, ferrite gives a purple tint which is also shown by a completely spheroidized high carbon steel. If, however, the spheroidization is not complete, other colors will appear, and this may be used to determine the completeness of the change.

Spring wire may be classified as:

1. High carbon wire used for such purposes as cushion springs.
2. Music wire.
3. Stainless steel wire.
4. Oil tempered wire.

In high carbon spring wire properly patented the austenitic grain size should be uniform and preferably coarse to give the best results. The most common percentages of carbon are between 0.45 and 0.75.

In making music wire Swedish steel has been mostly used, largely because great care is used in making and finishing the bars, and the low labor costs make it possible to produce the steel more cheaply than for a similar quality on this continent. Under present conditions this material cannot be replaced when used up.

Stainless steel is not suitable for heavy cold work. While it is true that a considerable amount of it is being employed for this purpose, the highly overstrained condition of this material makes it questionable.

The use of fine-grained steel is becoming more common in the manufacture of oil tempered spring wire.

Austempering is not feasible in the continuous production of wire because of the speed, though it can be used, of course, on small individual pieces or springs.

Wire Rope Talkie Shown

Reported by R. E. Neils
Design Engineer, U. S. Forest Service

Oregon Chapter—A very interesting talkie entitled "Sinews of Steel", which portrayed the making of wire rope from the iron ore to the finished product, was presented by Mr. Gillette of the Bethlehem Steel Co. at the meeting on Feb. 19.

After dinner, Chairman Healy presented Past Chairman Peck with a certificate in appreciation of his services as presiding officer last year.

The speaker of the evening was N. K. Koebel, research director, Lindberg Engineering Co., Chicago. Mr. Koebel gave a talk on controlled atmosphere heat treatment of metals, as reported in some detail on page 7.

Wanted

Leeds & Northrup instruments; controlling pyrometers, all makes; obsolete and defective types considered; parts also.

When appropriations are hard to get, use our offer for surplus and obsolete pyrometers to get new equipment.

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Carburizing Problems Are Discussed by McQuaid

Reported by R. C. Fox
Metallographist, Continental Motors Corp.

Grand Rapids Group, Detroit Chapter—In spite of extremely bad weather conditions, members and guests from Battle Creek, Kalamazoo, Muskegon and Grand Rapids gathered to hear Harry W. McQuaid talk on carburizing steels on Feb. 17.

Using slides to illustrate his talk and drawing upon his great wealth of experience, Mr. McQuaid touched upon the following subjects:

Reason for carburizing.
Pack carburizing.
Gas carburizing.
Case depths as related to fatigue.
Selection of steel for carburizing.
Relation of time and temperature to carburizing.
Normal and abnormal steels for carburizing.
Methods of quenching.

The problems facing the metallurgist during the coming days of restricted use of alloys.

51 Prizes Are Given for Monte Carlo Winnings

Reported by J. M. Gotshall
Asst. Chief Chemist, Timken Steel & Tube Div.

Canton-Massillon Chapter — Once again a Monte Carlo Party was scheduled as the Mid-Winter Frolic, held Feb. 21 at the Elks Club in Canton.

All types of games of chance were played with newly printed A.S.M. currency. Door prizes, odd money prizes and prizes for the most money were awarded, totaling 51 in number. Hats of many styles, sizes and shapes furnished by General Alloys Co., added much to the color and gaiety of the occasion.

Beverages were available throughout the evening and a buffet lunch of ample size and excellent quality was served.

The Entertainment Committee, headed by Dave Ladd and consisting of H. A. McKimmey, Sidney Poole, H. C. White, H. A. Tobey, E. C. Roglin and E. L. McReynolds, is to be highly congratulated.

Los Angeles Hears Koebel

Reported by R. Lowry
Metallurgist, Hydril Co.

Los Angeles Chapter—The February dinner meeting held at Scully's Cafe and attended by approximately 105 members and guests was addressed by N. K. Koebel of the research staff of Lindberg Engineering Co., Chicago. Mr. Koebel spoke with authority on many phases of atmosphere control, as reported briefly on page 7.

Vice-Chairman B. H. Brown presided at the meeting which was attended by National Secretary W. H. Eisenman. "Bill" gave a very peppy coffee talk including some data pertinent to his Ohio "rancho", which put the audience in high good humor.

Positions Open

RECENT GRADUATE: With training in metallurgy plus training in physical chemistry, chemical engineering, or physics. Must have ability to outline and carry on research of mechanical and physical natures. Ph.D. or man with equivalent training desired. Quality of report writing important. New England. Box 3-5.

SALES and Service Representatives: Heat treating products. Philadelphia, Cleveland, Cincinnati, Dayton, Buffalo, Baltimore territories. Box 3-10.

INSPECTORS, Chemical Engineers, Fuel Rating Mechanics: The United States Civil Service Commission has announced examinations in the above fields. Other openings are also available, and good men are badly needed. Apply to the Civil Service Commission in Washington, D. C., or to any first or second class post office for further information and application forms.

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Powder Metallurgy An Ancient Science

Reported by H. R. Boatman
Metallurgist, Inland Steel Co.

Calumet Chapter—"Three thousand years ago metal powders were probably in use." Such was the contention of J. E. Drapeau, Jr., technical director of the Metals Refining Co. of Hammond, Ind., in his address on "Powder Metallurgy", at the Chapter's dinner meeting on Feb. 18. He stated that relics found in Egyptian tombs are believed to have been produced from sintered powders.

Various processes used for producing metal powders were described. These included flaking in ball mills, spraying of melted metals in inert atmospheres, chemical replacement by electrolysis, chemical decomposition of organic salts, and reduction of metallic oxides to metallic state.

It is unlikely that the average ferrous metallurgist is aware of the properties desired in the metal powders, namely, uniformity of particle size and shape, apparent density, flowability, purity, stability, green and sinter growth, compressibility, and ability to blend without segregating and agglomerating.

Metal powders have found many uses in the electrical, mechanical and chemical fields. Commutator brushes, contact points in telephones, electro magnet alloys, and radio tubes are examples in the electrical field; in the mechanical field bearings, clutch facings and brake linings, gears, and cutting tools are typical. Uses in the chemical field are in paint manufacture, in filters, cements, and in catalyzers.

S.A.E. X4130 Is Most Important Aircraft Steel

(Continued from page 1)

present time is 70% copper, 30% lead on a steel backing. Some bearings consist of pure silver on a steel back.

Air-cooled cylinder heads are sand cast from "Y" alloy containing 4% nickel, 2% copper and 1.5% magnesium, which was developed in 1918. Although the casting practice used in the production of castings has been improved, the composition has not been changed. This alloy has higher strength at temperatures of about 600° F. than any other aluminum alloy.

Exhaust valves must withstand temperatures of 1600° F. and the material that has proven most satisfactory contains 15% nickel, 15% chromium, and 0.50% carbon. In some cases the valve stem has been drilled out and filled with metallic sodium which acts to conduct the heat to cooler regions.

In conclusion, Mr. Kennedy said that the steel mills have been very cooperative and have made every effort to develop steel for airplane usage.

CHAPTER CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Baltimore	Apr. 21	Engineers Club	O. E. Harder	Recent Developments in Metallurgy
Boston	Apr. 4	Chamber of Commerce		Sustaining Members Night
Buffalo	Apr. 10	Hotel Buffalo	R. H. Aborn	Metallurgy of Ferrous Welding
Calumet	Apr. 15	Woodmar Country Club, Hammond, Ind.	R. L. Heath	Metals in Aircraft Power and Transmission Units
Canton-Mass.	Apr. 24	Elks Club, Canton	O. E. Harder	Recent Metallurgical Developments
Chicago	Apr. 10	Towers Club	G. E. Brumbach	Tool Steels, Their Application And Use
Cincinnati	Apr. 16	Dayton		Tri-Chapter Meeting
Cleveland	Apr. 7	Cleveland Club	O. E. Harder	Industrial Importance of Intermetallic Compounds
Columbus	Apr. 8		J. R. Villela	Metallography of Steel
Columbus	Apr. 16	Dayton		Tri-Chapter Meeting
Dayton	Apr. 16	Engineers Club		Tools and Tool Steels (Tri-Chapter Meeting)
Detroit	Apr. 14	Webster Hall	C. L. Altenburger	Strain Aging and Related Phenomena
Hartford	Apr. 8	Hartford Electric Light Co. Audit.	George N. Sieger	Modern Welding
Indianapolis	Apr. 21	Washington Hotel	R. D. Allen	Production Heat Treating Problems
Lehigh Valley	Apr. 4	Hotel Traylor, Allentown, Pa.	J. E. Wiggins	Practical Metallurgy of Files
Mahoning Valley	Apr. 8		E. E. McGinley	Bessemer Steel Making
Milwaukee	Apr. 15	Milwaukee Athletic Club	Ralph F. Burns	Special High Grade Zinc, Its Production, and Use in Zinc Base Die Casting Alloys
Montreal	Apr. 7	Windsor Hotel	Peter Millar	Electric Welding
Montreal	Apr. 28	Windsor Hotel	W. Paul Eddy, Jr.	Automotive Service Failures
New Haven	Apr. 17	Conn. Light & Power Co. Audit.	F. L. La Que	Corrosion
New Jersey	Apr. 21	Essex House, Newark	James T. Kemp	Copper and Some Present-Day Copper Alloys
New York	Apr. 14	Bldg. Trade Employers Assoc. Clubroom	V. Zworykin	Electron Microscope
North West	Apr. 15	Coffman Memorial Union, Univ. of Minn.	G. D. Welty	Light Alloys and Their Application
Notre Dame	Apr. 9	Engineering Audit., Univ. of Notre Dame	H. H. Lester	Radiography—Its Place in Industry
Ontario	Apr. 4	Toronto	A. G. Green and R. Kirkpatrick	Abrasives
Peoria	Apr. 14		J. J. Caton	Is a College Education Necessary?
Philadelphia	Apr. 25	Engineers Club	R. M. Burns	Protection of Metals From Corrosion
Pittsburgh	Apr. 10	Roosevelt Hotel	H. J. French	High and Low Alloy Steels
Puget Sound	Apr. 9	Gowman Hotel	Alex Finlayson	Stress Analysis
Rhode Island	Apr. 2	Providence Engineering Society Bldg.	Carl F. Floe	Surface Hardening of Steels
Rochester	Apr. 18-19	River Campus, Univ. of Roch.	O. E. Harder	Sectional Meeting
Rockford	Apr. 23	Elks Club	Mr. Patterson	Powder Metallurgy
Rocky Mtn.	Apr. 21	Oxford Hotel, Denver	Wm. M. Barr	Materials and Specifications
Saginaw Valley Group	Apr. 15	Bancroft Hotel, Saginaw, Mich.		Rubber and Its Synthetics
Schenectady	Apr. 8		O. E. Harder	Recent Developments in Metallurgy
Schenectady	Apr. 22		Harry E. Lewis	Furnace Atmospheres
Springfield	Apr. 21	Hotel Sheraton	H. H. Harris	Heat Resisting Alloys
Syracuse	Apr. 1	Onandaga Hotel	G. C. Graf	The Potentiometer
Texas	Apr. 24	River Oaks Country Club	O. W. McMullan	Carburizing and Carburizing Steels
Toledo Group	Apr. 28	Surface Combustion Corp.	E. G. DeCoriolis	Plant Inspection Trip
Tri-City	Apr. 8	Farmall Club, Rock Island, Ill.		Making and Shaping of Steel (Movie)
Worcester	Apr. 9	Sanford Riley Hall, W.P.I.	Edward Bartholomew	Heat Treating
York	Apr. 9	Harrisburg, Pa.	W. J. Reagan	Basic Open Hearth Steels

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